



Materials Engineering Branch

TIP*



No. 128 Minimizing Stray Magnetic Fields through Materials Selection

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Using magnetic materials, components, and wiring layout that can generate magnetic fields must be minimized in constructing space flight hardware. Proper design and choice of manufacturing techniques can greatly reduce or eliminate stray magnetic fields.

General

- Keep electronic component lead lengths as short as possible.
- Avoid wiring loops and multiple ground paths.
- Use shielded wire or twisted pairs.

To reduce magnetic fields, avoid using ferro-magnetic materials for parts and structure whenever possible. The following is a categorized list of some commonly used structural and electronic materials:

NON-MAGNETIC

Aluminum
Alloy 30, 60, 90
Alloy 180
Beryllium
Beryllium copper
Brass
Copper
Carboloy

Germanium
Gold
Lead
Magnesium alloys
Manganin
Moleculoy
Molybdenum
Neutroloy

Nickel Silver
Phosphor bronze
Protoloy
Silver
Tantalum
Titanium
Tungsten
Zirconium

FEEBLY MAGNETIC

Stainless steel
202 and 300 series

K-Monel
Alloy 720

MAGNETIC

Cobalt	Invar	Pelcaloy
Copperweld	Kovar	Permalloy
Dumet	Mesoloy	R Monel
Electroloy	Molypermalloy	Remendur
Elinvar	Mu metal	Rodar
Fenicoloy	Nichrome	Silicone steel
Ferrites	Nickel 200, 270	400 Series Stainless
Gridaloy M,P	Nickel Iron	Supermalloy
Iron	Platinum	Vicalloy

¹ Material excerpted from NASA Report X-325-67-70, "Magnetic Field Restraints for Spacecraft Systems and Subsystems", by Charles Harris.